THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A bio-electrode with a biocompatible electrode-to-body interface surface layer providing a body-directed surface, said surface layer having on the basis of a DC analysis a bulk resistivity, as measured in a direction across said surface layer, parallel to the plane of said surface, ranging from 2 X 10 exp 5 to 10 exp 11 ohm-centimeters and having a reduced tendency for polarization to be formed within an electrolyte layer when present at the electrode-to-body interface and thereby reducing polarization noise.

2. A bio-electrode with a biocompatible electrode-to-body interface surface layer providing a body-directed surface, said surface layer having on the basis of a DC analysis a bulk resistivity ranging from 10 exp 3 to 10 exp 11 ohm-centimeters, as measured in a direction across said surface layer, parallel to the plane of said surface, and having a reduced tendency for polarization to be formed within an electrolyte layer when present at the electrode-to-body interface and thereby reduce polarization noise,

in combination with external circuit components for providing a closed circuit with a closed circuit path extending through the body, the bio-electrode, and the external circuit components, said circuit comprising the following features:

a) said bio-electrode having an electrode resistance value of Re,

b) the circuit including an amplifier resistive element which, together with a high impedance signal sensing circuit connected across such resistive component, has a composite resistance value of Ra, and

c) Ra and Re being in series

wherein the value for Ra is between 2 Mohm and 5 Gohm.

3. A bio-electrode as in claim 1 or 2 wherein said body-directed surface comprises a plurality of relatively conductive areas or "islands" of conductivity connected to conductive pathways passing through the bio-electrode, said islands constituting a reduced portion of the surface area of the body-directed surface and being surrounded by portions of the body-directed surface provided by a generally nonconducting background material of the electrode, which portions have a reduced affinity to attract polarization from within an electrolytic layer [illegible]resent at said surface sufficient to provide a reduction in the total po[illegible]ation that will form across the body-directed surface of the electrode.

4. A bio-electrode as in any one of the above claims wherein the electrode has a substrate providing the surface layer which substrate comprises said background material, and wherein said background material is rendered partially conductive by the presence of conductive additive that forms said conductive pathways within the background material.

5. A bio-electrode as in any one of claims 3 or 4, wherein the background material of the electrode is a material that is relatively non-polarizable and has a bulk of resistivity of in excess of 10 exp 12 ohm-cm.

6. A bio-electrode as in any one of claims 3, 4 or 5 wherein the background material is the composed of a material selected from the group consisting of neoprene rubber, silicone rubber, nitrile rubber, butyl rubber, EPDM, and olefin elastomers.

7. A bio-electrode as in any one of claims 3, 4, 5 or 6 wherein the conductive pathways provide conduction through the electrode by means of "percolation".

8. A bio-electrode as in claim 7 wherein such conductive pathways comprise carbon.

9. A bio-electrode as in claim 8 in wherein such conductive pathways are constituted by carbon.

10. A bio-electrode as in any one of claims 2 to 9 wherein said circuit comprises:

a) a total resistance R in the closed circuit wherein R equals (Re+Ra+3 Mohms), and

b) a source of polarization noise wherein the source of polarization noise is equivalent, at the moment of a noise discharge, to an effective or pseudo capacitor C present between the body and electrode at the body to electrode interface, and

wherein the values of R and C provide a time constant, RC, of one second or less for the polarization noise.

11. A bio-electrode as in claim 10 wherein the time constant RC for the polarization noise signal is less than 100 milliseconds.

12. A bio-electrode as in claim 10 wherein the time constant RC for the polarization noise signal is less than 10 milliseconds.

13. A bio-electrode as in any one of the preceding claims wherein said bulk resistivity is in the range 10 exp 6 to 10 exp 10.

14. A bio-electrode as in any one of the preceding claims wherein said bulk resistivity is in the range 10 exp 7 to 10 exp 10.

15. A bio-electrode as in any one of the claims 2 to 14 wherein the ratio Ra/Re has a value of 1 to 1 or higher.

16. A bio-electrode as in claim 15 wherein the ratio for Ra/Re has a value of 5 to 1 or higher.

17. A bio-electrode as in claim 15 wherein the ratio for Ra/Re has a value of 20 to 1 or higher.

18. A bio-electrode as in any one of the claims 2 to 17 wherein the value for Ra is between 20 Mohms and 5Gohms.

19. A bio-electrode as in claim 18 wherein the value for Ra is between 100 Mohms and 5 Gohms.

20. A bio-electrode as in claim 18 wherein the value for Ra is between 200 Mohms and 1Gohms.

21. A bio-electrode as in any one of the preceding claims wherein the body-directed surface of the electrode is substantially non-adhesive.

22. A bio-electrode as in any of the claims from 2 to 21 wherein the circuit components provide a minimum band pass range of from 0.05 hertz to 100 hertz for signals originating from a body for the measurement of ECG signals.

23. A bio-electrode as in claim 22 wherein the circuit provides a band pass of from 1 hertz to 100 hertz for the measurement of heart rate signals originating from a body.

24. A bio-electrode as in any of the claims from 2 to 21 wherein the circuit provides a band pass of from 1 kilohertz to 20 kilohertz for the monitoring of pacemakers present within a body.

25. Two bio-electrodes as in any one of the preceding claims in combination with a common mode noise differential sensing circuit whereby common mode noise presented to the differential sensing circuit by the respective bio-electrodes is canceled.